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# NEUROPSYCHIATRIC AEROMEDICAL REFERRALS: DO TRENDS VARY WITH AGE?

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## Summary

Four hundred eighty one records of aviators evaluated at the Neuropsychiatry Branch of the USAF Aeromedical Consultation Service were reviewed to assess diagnostic trends among this group. Sixteen psychiatric diagnoses were variously represented in the sample with relatively mild disorders (reactive disorders -- 19.7 percent, other psychosocial problems -- 15.2 percent, and neurotic disorders -- 13.3 percent) accounting for nearly 50 percent (48.2) of the disorders. Younger aviators were significantly less likely ( $p < .001$ ) to be seen for evaluation than older ones. Finally, diagnoses were not evenly distributed across all age groups; some diagnoses were more strongly associated with some age groups than others. Overall, results suggest some differential vulnerability to neuropsychiatric conditions depending upon the age of the aviator and the diagnosis in question.

## Introduction

Characteristic age of onset varies among neuropsychiatric disorders. Some, such as autism, are diseases of childhood; others, Alzheimer's disease, for instance, typically begin in the later stages of life. Similarly, military aviators face varying stresses throughout their careers. The initial challenge of pilot training is followed by those of flying with an operational unit, upgrading skills, engaging in "real world" missions, and often extended and frequent separations from their families. Toward the end of an aviator's career are the combined potential psychosocial issues of increased supervisory and leadership responsibilities, preparation for retirement, and adjusting to an upcoming "empty nest" at home. Given the varying biological clocks of neuropsychiatric illnesses and different stresses throughout an aviator's career it may be that there is a relationship between disease onset and career stage. The present study examines this issue. The records of aircrew members who were evaluated at the Neuropsychiatry Branch (ACS-N) of the United States Air Force (USAF) Aeromedical Consultation Service at Brooks AFB in San Antonio, Texas were reviewed in order to answer the following questions:

- What are the most common psychiatric diagnoses given to aviators seen at the ACS?
- Are aviators more likely to be referred to the ACS-N at certain ages than others?

- Are aviators of different ages at increased risk for certain psychiatric diagnoses?

The ACS is a multidisciplinary aerospace medicine diagnostic center that has five primary missions. These are to:

- **provide aeromedical evaluations** to determine and assess the fitness of aviators and related personnel to ensure performance and safety in the aerospace environment.
- **provide training** in aerospace medicine and other areas or expertise through teaching, mentoring, or publication.
- **render expert opinion** on specific questions related to health, safety, and performance of aircrew and other mission-related personnel.
- **provide allied technology** or other services in response to specific USAF, US Department of Defense, allied, or related operational requirements.
- **conduct research** to advance aeromedical knowledge and to improve performance.

Current ACS-N staffing consists of one neurologist, two psychiatrists, three psychologists, and five technicians. Patients are seen in the ACS-N upon referral from flight surgeons throughout the USAF when there is concern they may have neurological or psychiatric conditions that can effect their medical qualification for flying duties. They are rarely seen if it is aeromedically clear from the outset that they cannot be returned to flying status. Patients whose flying qualification (from a neuropsychiatric standpoint) is relatively easy to assess are normally managed at their local medical facilities. Consequently, those seen in the ACS-N typically present diagnostic and disposition challenges. Thus, they may not be representative of aircrew with neuropsychiatric disorders throughout the USAF; this limits the generalizability of the findings of this paper. ACS-N evaluations typically are very comprehensive, multidisciplinary, and result in aeromedical recommendations concerning flying status.

## Method

Records of all aviators referred to the ACS-N and receiving a psychiatric diagnosis during a six-year period (1993-1998) were reviewed ( $n = 481$ ). Since there were few active duty subjects older than 50 years of age, only those under age 50 were included in this

**Table 1 Diagnosis Frequency**

Diagnosis	N	% of sample
Reactive Disorders	80	19.7
Other Psychosocial Circumstances	62	15.2
Neurotic Disorders	54	13.3
Manic and Depressive Disorders	43	10.6
Special Symptoms	40	9.8
Alcohol Disorders	31	7.6
Family Problems	22	5.4
Personality Disorders	20	4.9
Psychic Factors Associate with Disease	20	4.9
Organic Disorders	19	4.7
Depressive Disorders NOC	16	3.9

study (n = 407). The sample was largely male (96.5 %), Caucasian (94.8%), officers (87%), and members of the USAF, Air National Guard, or Air Force Reserves (89.5%). Other organizations represented included the Army (n = 27), Army National Guard (N = 5), Army Reserves (n = 2). The mean age was 37.6 years with a 9.6 year standard deviation.

Psychiatric diagnoses included in this study are those which were given to at least 15 subjects and which may have a significant impact on their qualifications to remain on flying status. Sixteen ICD-9 diagnostic categories met these criteria. Additionally, certain diagnostic categories were combined when they involved similar kinds of disorders and when there were too few members in each individual diagnostic group to be useful, resulting in 11 diagnostic categories (see Table 1). The following nine categories were combined and labeled:

- Organic Disorders: Transient Organic Psychotic Conditions (293), Other Organic/Psychotic Conditions (294) and Specific Nonpsychotic Mental Disorders Due to Organic Brain Damage (311).
- Alcohol Disorders: Alcohol Dependence (ICD-9 303) and Nondependent Use of Alcohol (ICD-9 305).
- Special Symptoms: Physiological Malfunctioning Arising From Mental Factors (306) and Special Symptoms or Syndromes Not Otherwise Classified (307).
- Reactive Disorders: Acute Reaction to Stress (308) and Adjustment Reaction (309).

Subjects were divided into three age groups: 20-29; 30-39; and 40-49, representing early, middle, and late career stages. Data was analyzed using chi square tests and descriptive analyses.

## Results

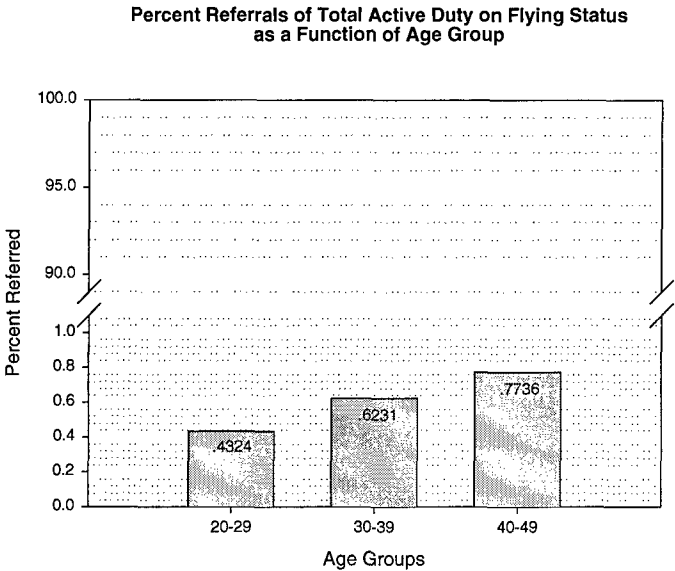
*Question 1: What are the most common diagnoses given to aviators seen at the ACS?*

The frequencies with which specific diagnoses were given during the period of this study are noted in Table 1. As can be seen, Reactive Disorders (n = 80) was seen most frequently and represented 19.7% of all patients. Other diagnoses that were given to at least 10% of patients were: Other Psychosocial Circumstances (n = 62; 15.2%) (e.g. occupational maladjustment, interpersonal or phase of life problems), Neurotic Disorders (n = 54; 13.3%), Manic & Depressive Disorders (n = 43; 10.6%) and Special Symptoms or Syndromes Not Otherwise Classified (n = 40; 9.8%) (e.g. sleep disorders, anorexia, stammering, tics). Taken together, these five diagnostic categories made up over two-thirds (68.6%) of diagnoses given. The top three diagnoses found here are often considered to be non-disabling, and mild in traditional mental health practice. However, these diagnoses can be dangerous in occupations requiring rapid information processing and higher order cognitive skills such as in military flying. Those diagnoses commonly considered the most disabling in traditional mental health work were more rare in this sample (e.g., organic disorders, psychotic disorders).

*Question 2: Are aviators more likely to be referred to the ACS-N at certain ages?*

Figure 1 shows the percentage of all USAF active duty aviators between the ages of 20 and 49 who were given a psychiatric diagnosis by the ACS during the period of the study and broken into the three age groups. If the incidence of psychiatric diagnoses were proportional regardless of age, the percentages for all three age groups should be approximately equal, demonstrating no difference between the groups. The results suggest

Figure 1



this is not the case. A chi square test was performed [chi square (2,  $N = 407$ ) = 57.50,  $p < .0001$ ] demonstrating that there are differences in the proportion of referrals across the three age groups. In particular, results suggest there is a greater percentage of referrals with increasing age. Research question 3 further evaluates this relationship.

*Question 3: Are aviators of different ages at increased risk for certain psychiatric diagnoses?*

This question was addressed through several methods. First, chi square analysis, using a diagnosis by age group frequency distribution (Table 2) was performed. This revealed a significant relationship [chi square (20,  $N = 407$ ) = 52.64,  $p < .001$ ]. It can be concluded, then, that diagnoses are not equally distributed across all ages. However, since there are no post-hoc tests for chi square analysis it is unclear where the distribution is unequal.

To further study this relationship the most frequent diagnoses were noted for each age group studied (see Table 2). What is apparent is that four diagnoses account for the top three diagnoses of each of the three groups studied. These are Reactive Disorders, Other Psychosocial Circumstances, Neurotic Disorders, and Special Symptoms or Syndromes Not Otherwise Classified. These are also among the five most common overall diagnoses noted in response to Question 1 (above). It appears, then, that while there may be some unequal distribution of diagnoses across the age groups, the most frequent diagnoses varied little among the groups studied.

Variability of diagnoses across the three age groups was also examined by looking at the percentage of members of each age group seen at the ACS-N who received each specific diagnosis (see "Difference" column in Table 2). The lowest percentage of referrals was subtracted from

**Table 2 Percentage of Age Group By Diagnosis**

Diagnosis	20-29	30-39	40-49	Maximum - Minimum Difference
Family Problems	2.3	5.8	6.8	4.5
Other Psychosocial Circumstances	24.7	10.5	15.9	14.2
Organic Disorders *	7.1	3.7	4.5	3.4
Manic and Depressive Disorders	9.4	10.0	12.1	2.7
Neurotic Disorders	10.6	14.7	13.9	4.1
Personality Disorders	8.2	6.8	0.0	8.2
Alcohol Disorders *	4.7	7.4	9.8	5.1
Special Symptoms *	14.1	11.0	5.3	8.8
Reactive Disorders *	18.8	19.5	20.4	1.6
Depressive Disorders NOC	0.0	2.1	9.1	9.1
Psychic Factors Associate with Disease	0.0	8.4	3.0	8.4

\* combined diagnostic category

the highest percentage for each diagnostic category. A large difference score suggests the age groups differ in frequency with which their members received the diagnosis in question. For example, 2.3%, 5.8%, and 6.8% of the early, middle, and late career groups received the diagnosis of Other Family Circumstances. Subtracting the smallest from the largest percentage results in a percentage difference score of 4.5%. The most variability was for Other Psychosocial Circumstances (14.2%). Depressive Disorders Not Otherwise Classified (9.1%), Special Symptoms (8.8%), Psychic Factors Associated With Diseases Classified Elsewhere (8.4%), and Personality Disorders (8.2%) evidenced the next most frequent variability. Therefore, in relation to the other findings associated with research question three, we conclude that there is a tendency for certain disorders to be associated with different age groups.

### Conclusions/Discussion

Given the study limitations mentioned above such as potential sample selection bias, results of this study revealed that five psychiatric diagnoses account for the majority of the psychiatric diagnoses given aviators at the ACS-N regardless of career stage. These diagnoses are Reactive Disorders, Other Psychosocial Circumstances, Neurotic Disorders, Manic and Depressive Disorders, and Special Symptoms. The top three diagnoses are considered mild, least disruptive to lifestyle, and usually not disabling in the general population. People with these diagnoses are most often treated as outpatients with brief psychotherapy and/or classes of psychotropic medication that are short acting. However, in demanding occupations such as military aviation, these diagnoses may represent the bigger threat just because these conditions appear not to interfere with daily living and can be denied or actively hidden. Further, while many of the other psychiatric diagnoses are obviously disabling, these "reactive," "neurotic" diagnoses are aeromedically disabling specifically in psychological areas critical to aviation: memory, attention-concentration, reaction time, speed of information processing -- that is, the higher cortical centers and resulting skills

Secondly, these results indicate that psychiatric disorders are not proportionately distributed throughout all three age groups. Generally speaking, there appears to be a positive relationship between age and probability of receiving a psychiatric diagnosis; younger aviators are less likely to have such a condition than older ones.

Finally, in this study diagnoses are not distributed evenly nor randomly across all age groups. These differences appear to be fairly subtle but may be significant. Other Psychosocial Circumstances and Personality Disorders were diagnosed more frequently in early career aviators than those in the middle and late

stage of their careers. Psychosocial circumstances that result in an aviator being seen for an ACS-N evaluation often involve adjustments to the aviation environment. This is more likely to be an issue early in an aviator's career since the problem either subsequently resolves or aviators with these problems are eliminated from flying. Similarly, aviators with personality disorders may present with behaviors that are incompatible with flying safety and mission completion; such conditions are likely to be identified early in an aviator's career and dealt with administratively. On the other hand, a comprehensive physical examination is required prior to beginning aviation duties. Consequently, it would be expected that early career fliers are infrequently seen for Psychic Factors Associated With Diseases Classified Elsewhere, and this appears to be the case. However, disease or injury becomes more likely later in an aviation career and this is consistent with the findings of this study. Mid-career aviators had this diagnosis most frequently. Finally, the late-career aviator group had more members with atypical depressive disorders than those earlier on. This could be the result of with preparation to leave military flying careers and adapting to civilian life, discomfort with increased levels of responsibility associated with increased rank, and other phase of life problems.

This study was designed to further knowledge of mental health issues confronted by aviators and their flight surgeons. These findings indicate that most common psychiatric problems encountered in this aviator group were reactive and stress related. Thus, one possible association for further evaluation is the role stress models (e.g., Selye) may play in age related psychiatric disorders. In aerospace psychiatry and psychology examiners often search for the answer to "why now" with the notion that a specific stress or occurrence related to the disorder might indicate a positive prognosis after effective treatment. These results might suggest, much as stress theories indicate, that small, incidental but regular stressors are associated with a variety of diseases (in this case psychiatric disorders) across time. These heuristic findings require further study, but if substantiated, could lead to clearer, more effective aeromedical decisions. Further, in this sample these top three most frequently seen disorders were generally evenly distributed across the three age groups except for the "other Psychosocial Problems" which were higher for younger and older aviators. Future research should further evaluate these findings and also identify significant stresses that may adversely effect the aviator in an effort to lessen these effects.

An understanding of the frequency and selectivity of psychiatric disorders among aircrew and as related to career stage may help flight surgeons identify precipitating stresses in fliers and initiate early intervention that may avoid the loss of valuable crew.